POPULAR MECHANICS

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"Tells you how to do things." Written so you can understand it.

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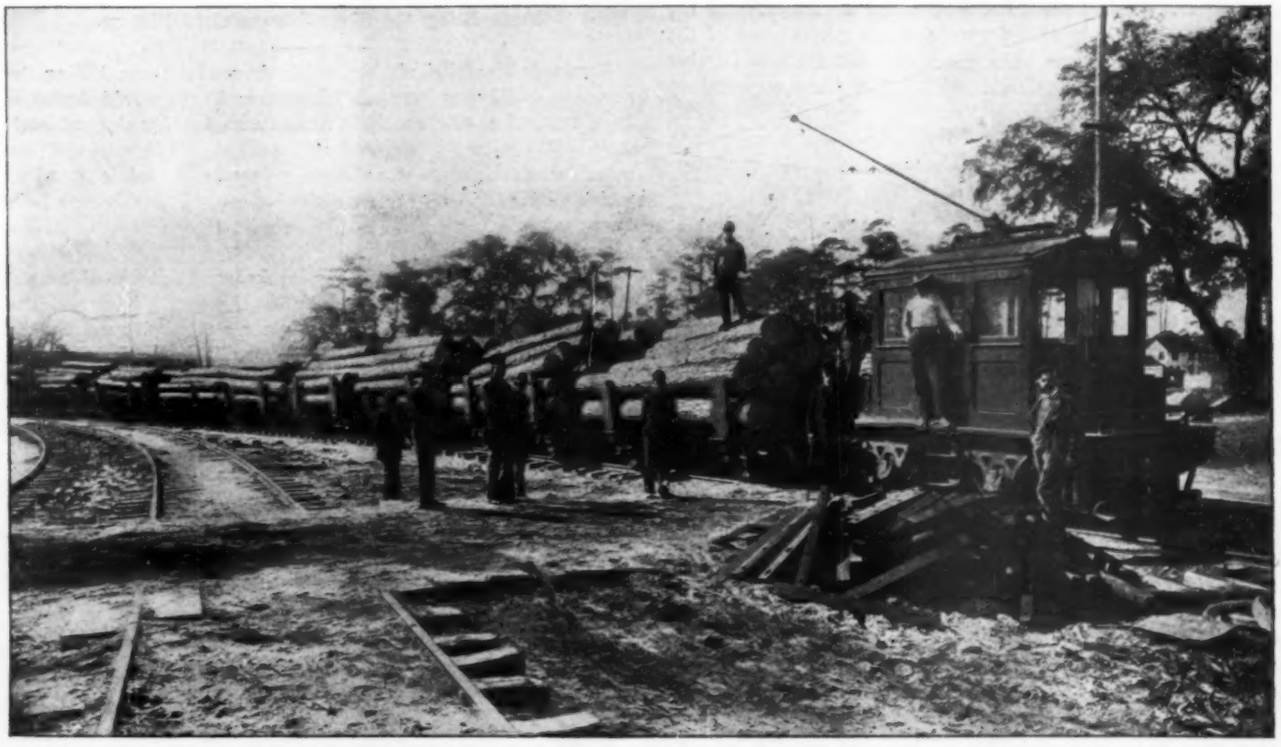
Electric Locomotive Proves Its Power



Small but Powerful Electric Engine Hauling a Heavy Train of Logs

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Reserving Car Seats in France.

PASSING OF THE STEAM LOCOMOTIVE.

Era of Electric Long Distance Traffic May at Last Have Begun.

Recent successes attained by electric locomotives in pulling long trains have opened the eyes of railway men and electrical engineers to the possibilities of electricity for heavy traffic. These late achievements cause many to believe that steam as an agent of locomotion is doomed and that electricity will soon become the universal means of transportation on land. The cost of hauling trains across the continent will be reduced to half, it is claimed, whenever the problem of the electric engine for heavy traffic has at last been solved.

It was the splendid work of the electric locomotive shown on the front page that has attracted the attention of engineers to the much greater results that may be possible. The locomotive is but one of many, some of which are more powerful, that have recently been built by the Westinghouse Co., and the Baldwin Locomotive Works for service in various parts of the world. This engine was built for the Atlantic Coast Lumber Co., of Georgetown, S. C. It might have been regarded as something of an experiment to determine the practicable service of the engine for heavy traffic. Its success has been greater than the most hopeful expected. It is a 4-foot, 8½-inch gage locomotive weighing 13 tons. It has four wheels and is driven by two motors capable of exerting a full load draw-bar pull of 4,500 pounds at a speed of 6 miles an hour. A series-parallel controller is used which permits of a speed of three miles an hour with the motors operating in series. The engine is used to haul trains of logs from the forests to the mills of the lumber company at Georgetown.

SWEETHEART'S PHOTOGRAPH ON HER ARM.

Fad of Skin Portraits Said to Be All the Rage in New York.

Whenever a New York girl becomes engaged to a young man, according to the half-penny newspapers in London, she has his likeness photographed on her arm. According to these London newspapers this arm photography is all the rage in America's metropolis, and many fair maidens there may be found with numerous photographs adorning their creamy complexions beneath the clothing. The editor of the Amateur Photographer says: "I have been in localities where arms, and especially New York arms, were much in evidence, but I did not see a single example of the arm portraiture." This editor ought not to have left us to guess where he had been. But he says such portraiture is simple, and the man who patents the process may make fortunes. Women's arms when exposed to the summer sun, he says, often become very dark, and all that would be necessary to produce a portrait in tan and white would be to properly place a film negative on the desired spot before the tanning begins.

NATURAL GAS IN ENGLAND.

An American Astonished the Natives When He Tapped a Big Flow.

There may be millions of feet of the finest natural gas in the world lying dormant under the feet of sleepy Englishmen. The supply may be sufficient to furnish light and fuel to the island for years to come. How great the amount is no one yet knows, but recent developments have opened wide the eyes of the natives. Six years ago a small flow was struck in sinking a well, but no one seemed to attach any importance to the discovery. A short time ago an enterprising American chanced to hear of it, and quietly made some investigations. He lost no time in securing an option on the property, and put down a well. At only 500 feet a rich find was made, and a flow of 15,000,000 cubic feet per day was secured.

The pressure on the different wells varies from 140 to 200 pounds per square inch, the latter figure representing about 9,000 horse-power per day.

The unusual quality of the gas is one of the surprising features. It is so rich and pure it can be burned in ordinary burners for illuminating purposes, and when so used yields from 12 to 14 candle-power and burns without smoke or smell.

The fuel problem caused by the exhaustion of the English mines may thus be deferred many years if the discoveries at Heathfield, Sussex, are duplicated elsewhere. The expectation of scientists, who have now awakened is that the field is a wide one.

AERONAUTS DROP FROM THE CLOUDS TO DEATH.

Slight Miscalculation Prevents De Bradsky's Aerial Voyage From Being the Most Successful in History.

Baron de Bradsky' airship which dropped its car, killing the aeronaut and his assistant, M. Morin, in Paris, would doubtless have marked a new epoch in aeronautics but for the sad accident. The airship behaved with perfect obedience, and the catastrophe was caused solely by weakness of the wires which suspended the cars from the balloon. The ship was built on an entirely new principal. With its two aeronauts it displaced its own weight in air.

De Bradsky's wife was possibly the most interested among those who witnessed the ascension. De Bradsky started the ascensional screw situated below the car and the airship held by ropes rose easily and maintained its equilibrium. Crossing the main boulevards the aerial craft executed a number of evolutions, but continued northward with the wind, eventually disappearing over the great white basillica of the Church of the Sacred Heart and the top of the hill of Montmartre. The baron seemed able to steer the ship in any direction he desired. He visited Santos-Dumont at the Hotel Ritz, hovering in the air on a level with the window of Santos-Dumont's room for ten minutes. He then departed for the Champs Elysees. All the time the craft was in sight the aeronaut's wife looked on and displayed great emotion.

After remaining out of sight for some time the balloon again appeared high in the heavens. An expression of awe came from the lips of Mme. de Bradsky and other spectators. They knew that he had never intended to soar at such a height. A second glance convinced them that their terror was not without cause. Higher and higher rose the balloon, but the car—the car was gone. Unguided the balloon continued its upward flight until it disappeared in the clouds. Mme. de Bradsky uttered a cry of horror and was carried from the scene. Later she was informed that the car containing her husband and M. Morin had dropped from 800 feet in air and the men had been dashed to death near St. Denis, 5½ miles from the center of Paris.

De Bradsky's airship was egg-shaped, 100 feet long and 20 feet in diameter. A light wooden frame work running around the balloon supported a car on steel wires. The car, constructed of hollow steel tubes, was 65 feet long and weighed, with a 16 horse-power motor, 1,400 pounds.

Santos Dumont said: "The principal of using wires to suspend the car from the envelope, instead of ropes was correct, but de Brasky did not calculate correctly the strength of the wires."

"Popular Mechanics should be in every household where there are boys or young men. Our file is available to any one desirous of becoming acquainted with the merits of this excellent publication."—The Journal of Commerce, Melbourne, Australia.

The Standard Oil company will use oil for fuel in its large refineries in Greenpoint and Long Island City.

Traction Engine Climbs Incline

Wonderful Performance at Minneapolis.

Most people would rather witness the performance of this feat than to be the person that performs it. It would seem that the job of the man behind the gun would be a safe position in comparison to the occupation of the man behind this traction engine. But Jacob Johnson jovially jaculated the joggling jolter up the narrow incline until the front wheels balanced on the topmost board. The incline was 11½ feet high and 20 feet long. The scene of the remarkable performance was at the Minneapolis State Fair. The machine has a 20 horse power engine and boiler, which carries 120 pounds of steam.

The Thresher World says: "A great multitude of people witnessed this marvelous performance, and seemingly their hearts came into their throats when it began to climb with such swiftness and apparent reckless boldness, fearing, as they did, that the engineer might not stop it in time to prevent its plunging over the top."

OUR NOBLEST SHIP A RUSTED HULK.

The United States ship Baltimore, a short time ago the pride of the American navy, now lies a rusted, dismantled hulk at the Brooklin Navy yard. She is soon to be repaired, however, and made like new. The Baltimore of a few years ago ranked without a superior. It was the vessel that Schley commanded. In many a tilt under that gallant commander it brought fame and honor to Uncle Sam, events almost forgotten since the navy clique aided by the chief executive has decided that there shall be no heroes outside of its circle. It was the Baltimore, under the command of Schley, that demeaned itself so nobly and valiantly when her sailors were set upon by a mob at Valparaiso, stoned, beaten and shot at. One of the sailors—Riggin by name—was killed. By the prompt action of Admiral Schley the Chilean government was forced to pay heavy indemnity to avoid war with the United States. The Baltimore was the ship that carried to his own country after years of burial here, the body of John Ericson, inventor of the monitor, father of all ironclads.

FLOATING MACHINE SHOP REPAIRS SHIPS.

Instead of Taking the Vessel to the Work-Shop, the Shop Now Floats to the Vessel.

It used to be that a ship, when damaged, was taken to the workshop for repairs, but now the workshop goes to the ship. At least, this is the way they are doing in England, which Americans are prone to call slothful. A great floating machine shop, equipped with everything to repair any damage to a modern steamship, has just been installed by the Mordey-Carney Company, at Southampton, Eng. The shop was first brought into service in repairing the Atlantic liner, Philadelphia, in the Prince of Wales Drydock, where it was the center of attraction to a curious throng. The London Shipping World, in speaking of the new device, says:

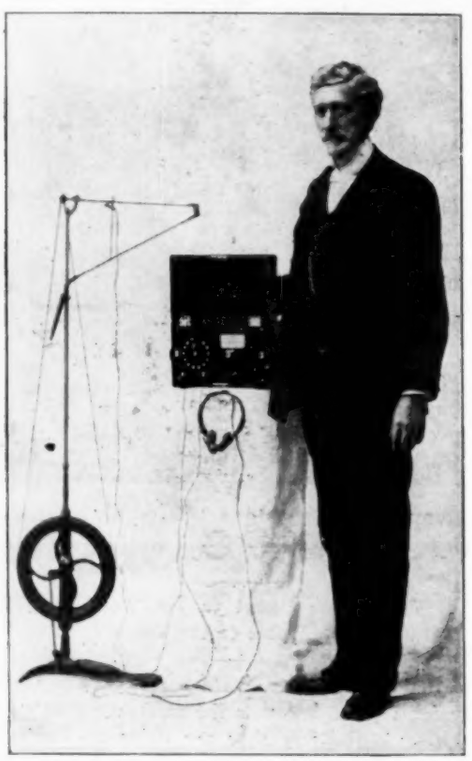
"We know that electricity as a motive power has done much to overcome the disadvantages of distance, but there are limits even to the portability of electrically-driven tools, and with them the closer the generator is to the motor the more economical is the working. And many a bar, or angle, or plate has to go to the forge before the job is finished, necessitating transport to and fro and consequent loss of time. And it was with a view of enabling them to bring the most powerful appliances, regardless of their weight and the power required to drive them, to bear upon any repairs entrusted to them that the firm mentioned have constructed an iron floating workshop, the dimensions of which—76 feet long and 30 feet wide—allows of its containing the necessary assortment of machinery and tools, all of which, it is needless to say, are of the most modern type."

"Popular Mechanics is an entirely new idea. It is a review of all the mechanical and engineering papers of the world, but 'is written so you can understand it.' It interests everybody interested in mechanics."—The Daily Telegraph.

USE ELECTRICITY IN PULLING TEETH.

"Laughing Gas" Gives Way to a More Modern Way of Tickling the Patient.

Electricity seems to be exerting itself to show that it can keep a little ahead of any kind of gas for almost any use. It is trying to dethrone gas from its position as a source of light and heat, and now it has entered the dentist's office to oust that comic class of aeriform fluid known as "laughing gas." In the future when we go to have a tough incisor extracted we will not be treated to a sniff of "laughing gas," but will be tickled with a



Electric Anæthesia in Dental Surgery.

shock of "exultant electricity." The latter is the more up to date. This is the electrical age.

The new electrical method of making tooth-pulling a pleasure instead of pain is the device of Thomas W. McCue, of Akron, O. The inventor and his mirth-provoking machine are shown in the accompanying illustration. The tickling sensation is administered to the face through the headpiece, to which the negative side of the circuit is connected. This head piece has terminals which are placed in contact with each side of the jaw and held in position by means of a hard rubber band. The positive side of the circuit is attached to the forceps and the electric current passes through the dental instrument to the patient's tooth. The machine, it is said, short circuits the pain by preventing the transmission of the sensation impulses to the brain. This is done with low voltage and high resistance.

Excessive hilarity on the part of the patient is prevented by the perfect control the operator has over the current, which, it is said, is reduced so fine that no instrument can measure it.

Whilst half the country's on a strike
An' takin' all the street,
We're raisin' cane in Georgia,
But—ain't it sugar-sweet?

—Atlanta Constitution.

Popular Mechanics is "written so you can understand it."

THE GRANDEST MUSICAL INSTRUMENT IN THE WORLD.

Great Organ at Salt Lake, Built By Brigham Young in 1863, Is a Wonder to This Age.

Although built as long ago as 1863, the great organ in the Mormon Temple at Salt Lake, Utah, is probably the grandest instrument in the world. No other organ in American can even compare with it, either in size, elegance of appearance or grandeur of tone. But while the organ was built so long ago it has been constantly improved until now there is nothing wanting in any of the latest mechanical devices.

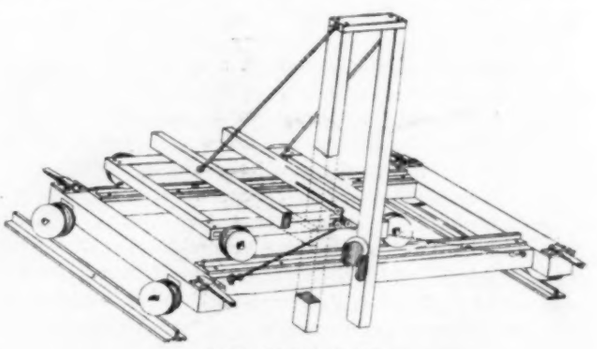
It was under the supervision of Brigham Young that the mammoth instrument was constructed. He said it should be in harmony with the immense tabernacle. Great difficulties in building the instrument were encountered in those early days. The most serious obstacle was in obtaining wood for the gigantic pipes. Some of these pipes took as much as 800 feet of lumber for each. The mountains far and near were scoured for the proper kind of pine, hundreds of loads of which were hauled by teams from a point nearly 300 miles south of Salt Lake. It required two months to make a round trip. The workmen were all pioneer settlers. The method of uniting the wood was unique, the closest joining being done by means of home-made glue, the making of which consumed hundreds of cattle hoofs, while numberless calf-skins were used in making the bellows. Altogether ten years were consumed in the building.

A year ago a great many of the old pipes were taken out and thoroughly overhauled, and more than 4000 new ones were added. The instrument's action is marvelous and more responsive than a grand piano, as it has no "inertia" to overcome. The repeating power of each key is 726 times to the minute. Any combination of tone desired can be distinctly brought out. Especially fine are the "string" tones, the violin, viola gamba, cello and bass; the clarionet, oboes, bassoon, eight varieties of the flute tones (each one true to its name), four piccolo stops, four trumpets, tube trombone, saxaphone, clarion and the vox humana, which is the pet of the organ and makes "human" tones that deceive even the trained musician.

In all the organ contains 408 stops and accessories—five complete organs, viz., solo, swell, great, choir and pedal. The speaking length of the pipes varies from a quarter of an inch to thirty-two feet. In "full organ" passages the immense bellows displace 5000 cubic feet of air per minute.

ADJUSTABLE PILE DRIVER.

An improvement in pile drivers has been devised by a man in Pennsylvania. The cut shows the arrangement of the two trucks,



Adjustable Pile Driver.

one of which permits of a backward and forward movement, while the other moves sideways as desired.

"Popular Mechanics is edited by Henry H. Windsor, a noted mechanical expert."—The New York World.

SMALLEST PASSENGER CARS IN THE WORLD.

Tiny Railroad in Japan on Which the Trains Are Pushed by Hand.

Cars so small that they look like toys to the American tourist are run on the little railroad, 20 miles long, between Atami and Yoshihama, Japan. This is the most unique and remarkable railroad in the world. The tiny cars, often made up into trains of first-class, second-class and freight cars, are pushed by hand. The Japanese, naturally small of stature, can barely sit erect in the little passenger coach, and the stalwart American has to double himself up into various curves and angles in order to become a passenger. The "engineer" stands on the front platform to work the brakes and blow his horn on rounding down grade curves and at crossings. A glance at the accompanying illustrations will give an idea of the size of these, the smallest railway cars, for practical service, in the world. A writer in the Four Track News for October, from which these illustrations are taken, in describing a trip of himself and party over this line, says:

"The engineer on the front platform gave a blast of his horn, and we were off at a lively pace. Gripping a hand rail on each side of the rear end of the car, two powerful little coolies, pushing and puffing at a great rate, furnished the motive power which sent us buzzing over this remarkable little route, through most engaging scenery. When under good headway, or going down grade, the 'motive power' would jump on the rear platform and enjoy a period of rest, as the car sped on of its own volition. As we whizzed around the curves it kept the engineer busy trying to hang on.

Ready to Start.

"This miniature monopoly runs its distance through tiers of rice paddy fields and fine groves, skirting the sea of Japan, some 450 feet above sea level. In America a trip of this character, which occupies about five hours and the services of three men, would cost several dollars, while in Japan, including the tip for the coolies' tea, the entire cost was but 21 cents."

First Class Car and Baggage Car, Rice Paddy Fields in Distance.

Second Class Car

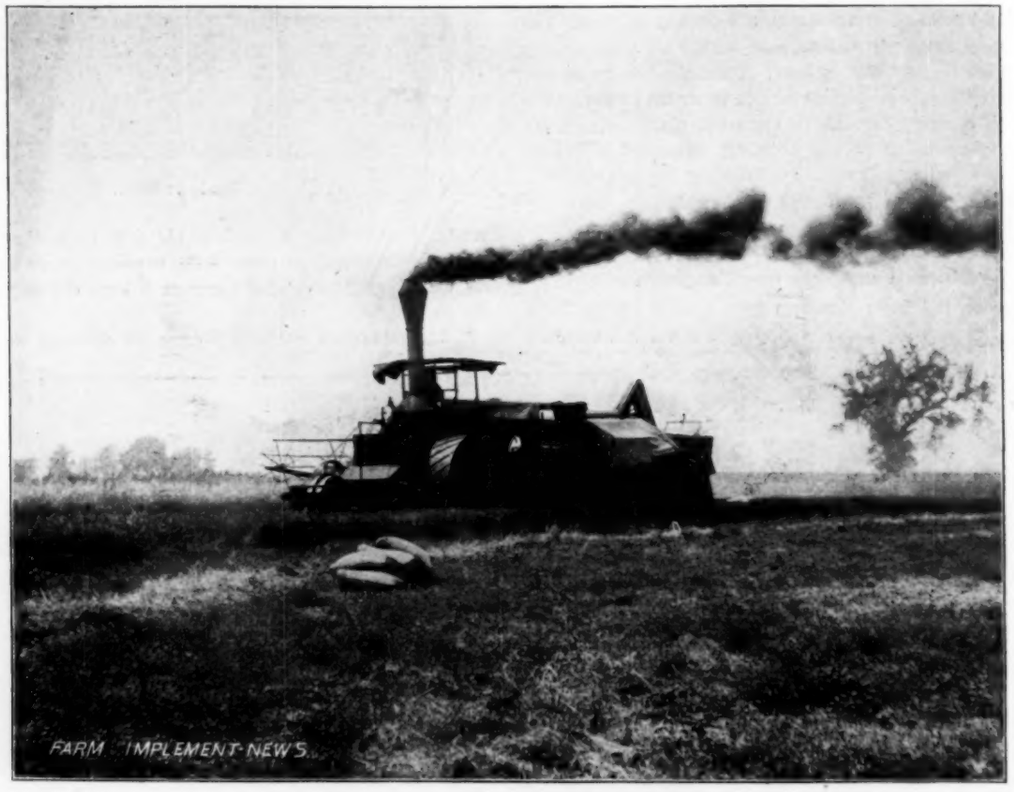
AMERICANS WEARING DIAMONDS.

Exclusive of the enormous amount of diamonds that are smuggled into the United States, the diamonds imported—those on which duty was paid—during the last fiscal year amounted to $23,000,000. It is well known that most Americans who pay as much as $10,000 or $20,000 for a necklace in Europe try to avoid the payment of several thousand dollars additional by hiding the gems from the custom-house officials. These smuggled diamonds are said to look just as pretty as the others, and their owners, though seldom anarchists, regard a duty on diamonds as an outrage on personal liberty. So it is certain that if the value of the smuggled gems were added to that of those on which duty was paid, the above figures would be several times doubled. In one 24 hours of last month $800,000 worth of diamonds passed through the appraiser's stores at New York.

CLEARS UP THE CROP AS IT MOVES ALONG.

Huge Harvester that Cuts, Gathers, Thrashes, Bales and Sacks the Grain with a Single Handling.

A device that mows down the grain, thrashes it, packs the grain into a sack and bales the straw has made its appearance in the great fields of the Sacramento valley, California. The machine is called a harvester, and it is a "harvester" in the full sense of the word. Instead of having to cut the grain, gather it up, haul it away to the stationary thrasher, remove the straw to the baling machine, and then go through the manual labor of filling the sacks, this remarkable machine does the whole work as it moves along. It is a kind of harvester, thrashing machine, binder and sack-filling machine combined. A farmer doesn't need anything else in harvesting his crop, and the work will be done in one-fifth the time with one-fifth the labor he has ever employed before. The machine is a mammoth device that makes lots of noise as, collossal like, it rides over the fields, leaving a clean path in its wake. The Farm Implement News says it is the invention of Daniel Best.



Steam Harvester Cleaning Up a Crop in California.

SMOKELESS LOCOMOTIVES ON THE N. Y. C.

Smokeless combustion of coal on locomotives is required for all new passenger equipment on the New York Central railroad. President Waitt, of the Railway Master Mechanics' Association, who is superintendent of the motive power and rolling stock on the New York Central, says that the method now employed on that road has been tested for months on a number of locomotives and has given perfect satisfaction. About ten sets of the apparatus per month are being added to old passenger engines. The smoke consumer can be applied to any locomotive.

THE LOCOMOTIVE OF THE FUTURE.

New Type to Be Built in Germany May Be an Ideal for All Nations to Copy.

By Frank H. Mason, United States Consul-General at Berlin, Germany.

The new steam locomotive to be built in Germany, we are assured, will be especially constructed to avoid pounding of the track caused by the unbalanced parts and oscillating strain of the engine of to-day. It will rest on twelve wheels, two pairs of drivers located at the middle of the machine, with a four-wheeled pivot truck in front and rear. Upon these three points the boiler and superstructure will be hung upon springs carefully adjusted to take up as far as practicable the inevitable vibration and oscillation. The engine will be of the compound type with three cylinders, and in order to secure the most perfect practical balance of working parts two of these will be connected outside, as in an ordinary locomotive, while the third, or high-pressure cylinder, will be hung at the center and connected inside, working upon a mid-axle crank, set at 90 degrees from the crank-pin of the two outside cylinders, which are set opposite each other.

The boiler will have an interior heating surface of more than double that of a standard German express locomotive as now constructed. Throughout the entire train superfluous dead weight will be carefully avoided. Instead of carrying 10 tons of water, the new tender will be built to take only half that amount, but will be rigged to take up water en route, as has been successfully done on some American lines. As now planned, the new engine will have, theoretically, a coal consumption of 2.35 pounds, per effective horse-power hour, as against 2.62 pounds, which is the standard of economic efficiency in the best locomotives of the present German type. It will be interesting to compare this forecast of theoretical efficiency with the actual results which may be attained when the new engine is tested, which will probably be done during the course of next year.

SPLENDID RUINS OF FORGOTTEN AMERICA.

Great Mechanical Skill Displayed in the Magnificent Structures Now Crumbling With Age.

Americans living in the north usually go to Europe to see ancient ruins. Few realize that here in America may be viewed ruins of as great historical significance and romantic associations as almost any to be found across the ocean. In Western Texas, New Mexico and California are to be seen many crumbling buildings, remnants of a former American civilization of which the present inhabitants of the country have little knowledge. There are ancient systems of irrigation with buried reservoirs and pipes, a study of which might be of great value to those who are at present wrestling with the irrigation problem. There are ruins of great buildings, mostly missions and cathedrals established by the Franciscan monks, which have stood the storms of hundreds of years. Indeed the American lovers of antiquity can find much more to their liking in the far southwest than in the old cities of New England.

Where Santa Anna, Head of the Mexican Army, made his Headquarters during the war with Texas.

Wonderful mechanical skill is displayed in these structures of almost forgotten American history. Few of the most imposing edifices now being built in New York and Chicago but will have crumbled to dust before they have been exposed to the ravages of time half so long as the early-day missions. One need go no further than San Antonio, Texas, to find these ancient relics of a former civilization in abundance. This queer and cosmopolitan city can be reached in a few hours over the Iron Mountain railroad, whereas weeks might be spent in a journey to less atractive ruins of ancient Europe. The Cathedral of San Fernando, shown in the accompanying illustration, is one of the most interesting of the antique structures. Just when it was built no one knows, but it is older than the oldest building in any part of the East. Its towering, weather-streaked walls are monuments to the builder's skill of Franciscan days. Around this old structure is woven a net of historical associations that will be a mĕcca to the historical novelists whenever he chances to make the discovery. It was here that Santa Anna, the Mexican general, made his headquarters during the war with the Republic of Texas, which resulted in such glorious victory for the gallant Texans.

GARDEN IN THE ARCTICS.

The first experimental garden in Alaska, north of the Arctic circle, has shown some queer results. The garden was grown by the International Polar Exposition at Point Barrow. Here the Polar night, which is 70 days long, ends January 23. The arctic day, which also lasts for 70 days, begins in the middle of May and lasts until July 24. The garden was planted near the coast on a loam-like soil above a sub-soil that is perpetually frozen. This loam-soil thaws in midsummer to a depth of from three to nine inches. The garden was dug to a depth of four inches and raked, no other attention being given it. Seed of lettuce, radish and mustard were sown June 13. Eight days later the lettuce and radish germinated, but the mustard failed. During seven of these days the minimum temperature was below the freezing point. Flurries of snow were frequent. On July 10, twenty-seven days after seeding and nineteen days after germination, harvesting began. The vegetables, while somewhat small, were perfect in condition. They could not be excelled in quality by those grown in any climate.

New Orleans is as large as Chicago in area. Both cities contain 122,240 acres. New York has 209,218 acres, and is, therefore, the largest city in the United States in acreage as well as in population.

"Popular Mechanics, an illustrated weekly review of the mechanical press of the world, contains many pages of mechanical interest."—Los Angeles Times.

American apple growers will hold their first congress in St. Louis, November 18 and 19. Delegates to the preliminary meeting represented 50,000,000 bearing apple trees.

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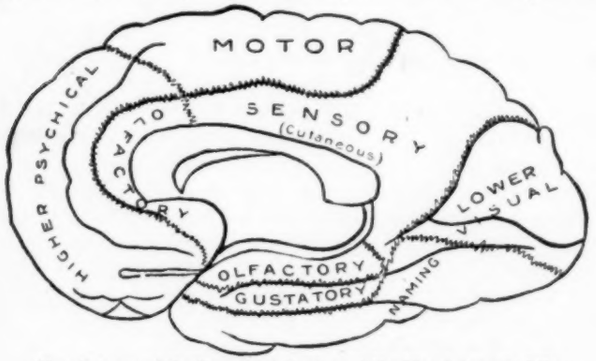
HOW TUMORS ON THE BRAIN ARE LOCATED BEFORE THE SURGEON USES HIS KNIFE.

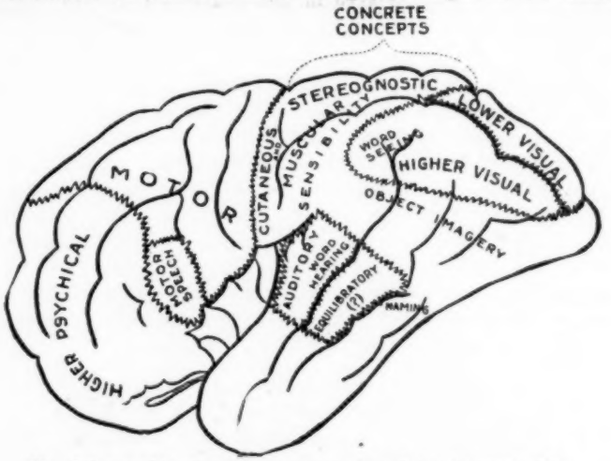
Disorders affecting the use of the limbs, sight, hearing or speech are often caused by tumors on the brain. If these can be located and removed, there is a fair chance that the lost power can be restored. The tumor cannot press outward and lift the skull as it does the skin in other parts of the body, hence the larger it becomes the more it presses against some portion of the brain, and the nerves which govern the action and use of certain muscles become more and more powerless to act, and the patient becomes more blind, or stiff limbed, or unable to talk, as the



New Scheme of the Zones and Centers of the Mesal Aspect of the Human Cerebrum.

case may be. It will be easily understood how difficult a matter it is to locate these tumors by examining the outside of the skull. On the other hand, the surgeon cannot very well remove the entire top of a man's skull as he would take off a hat, while hunting for the disturbing bunch. Indeed, it is often imbedded deep in the brain.

The brain specialist by years of study and record of thousands of cases has gathered facts which enable him to locate just what part of the brain is in trouble, by the general symptoms. It is a good deal like the Bertillion system of identifying criminals. When they find a man whose ears and thumbs and nose just fit the description, its pretty sure to be the one wanted. So when a certain combination of symptoms are found, the brain specialist first locates the tumor in some one general organ of the brain,



New Scheme of the Zones and Centers of the Lateral Aspect of the Human Cerebrum.

and then proceeds to determine which part of that organ is most affected. Often the symptoms show weakness in two organs, which is an indication that the tumor lies between the two.

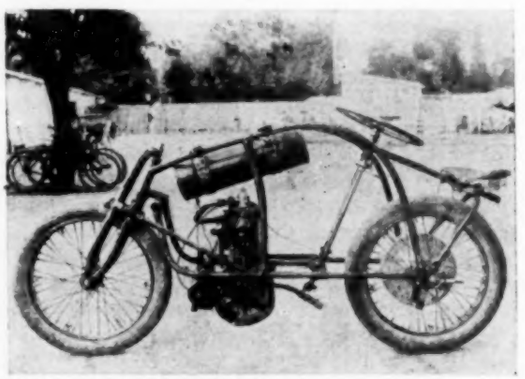
When the exact location has been thus selected after a careful study of the patient, the brain expert is ready to show the surgeon just where to operate for the tumor, and he rarely fails to find it where predicted. The Journal of the American Medical Association prints the latest chart of the various functions of the brain, as compiled by Dr. Chas. K. Mills, brain specialist in the Philadelphia Hospital.

REMARKABLE MOTOR BICYCLE.

Ingenious Device of a Frenchman That May Revolutionize the Method of Construction.

A motor bicycle which may cause a complete change in the style of this kind of vehicles has been built by a Frenchman named Jaquelin. It is a queer looking contrivance, but its construction seems to adapt it more perfectly to the requirements of speed and convenience than anything that has ever before been built. In speaking of the machine the Motor Age says:

"It is of startling and certainly ingenious construction. The gasoline tank is carried above the motor on the arched frame shown in the illustration. The motor is located vertically between two horizontal bottom tubes. The machine is fitted with

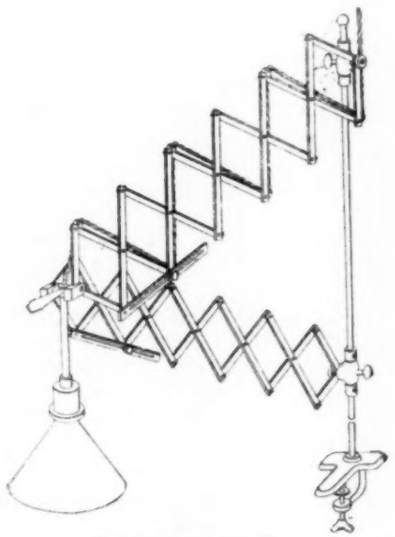


The Jaquelin Motor Bicycle.

wheel steering device the same as an automobile. Its weight is said to be only 140 pounds. The motor is 4.5 inches bore and 4.72 inches stroke, is 8 horse power, and has developed a speed of 58.9 miles per hour.

ADJUSTABLE ELECTRIC LIGHT BRACKET.

For work at benches and places where it is desired to frequently shift the position of a light, and yet necessary that it be held



Moves in Any Direction.

perfectly still, the invention of a Brooklyn man is likely to be adopted. The device permits of the light being moved in all directions.

CANAL BOATS OBSOLETE.

On all the canals of New York state, including the great Erie canal, there are now in commission only 406 boats. Great shipyards where a generation ago hundreds found employment in building canal boats, have long since fallen into decay. Only three new boats were built this year. The self-made men of the future will have to start somewhere else than on the tow path.

CHEAP AUTOMOBILE STABLE.

An automobile stable 9 x 12 feet, and 9 feet high, sloping to 6 feet in the rear, and costing only $74, is described in the Automobile and Motor Review. The frame work is of 2 x 4 inch with 4 x 4 inch beams set in posts driven in the ground. Sides and roof of 12-inch boards with cracks battened. The machine rests crosswise of the floor leaving room for a bench lighted by a window. The gasoline tank is outside, underground.

SAILING AROUND THE COW.

A sea captain of the East Indies relates a queer experience of his own in the Coast Seamen's Journal. The captain was out on a foggy night, and sounded his fog horn, as every wise captain should. From the starboard side came the sound of a fog horn, apparently from a vessel very close and showing no lights.

"Port your helm!" shouted the captain and the order was obeyed. Then he blew his horn again. Back from the same relative position, although the ship had altered her course three points, came the sound of that answering fog horn.

"Hard aport!" roared the captain. That too was done, and the signal was tried again. Back from exactly the same position, although his vessel had now changed her course seven points, came the sound of that fog horn.

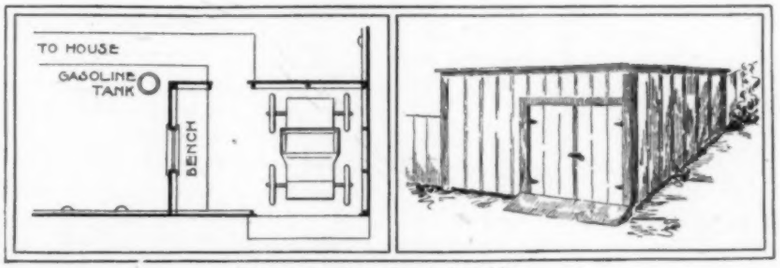
The captain, alarmed, was just going to give the order to reverse engines when one of the officers discovered that the supposed fog horn was only the cow that was carried on the forward deck to supply fresh milk for the passengers.

THE COPPER AGE.

The Nineteenth Century was an age of iron because it was an age of steam; the Twentieth Century will be an age of copper because it will be an electrical epoch.

No other metal has yet been found to take the place of copper in electrical work. Steel rails and aluminum wires have been used to a small extent as conductors of large currents, but for the thousand and one uses in motors, generators, switchboards and electrical instruments, copper is king. Copper is found in comparatively few places in the world.

It is estimated that the world will yield this year 2,905,320,000 bushels of wheat, 1,579,040,000 bushels of rye, 1,141,680,000 bushels of barley, 3,004,720,000 bushels of oats, and 2,973,480,000 bushels of corn. Why need any one starve?



Inexpensive Barn for Automobile.

MONUMENT TO THE AMERICAN NAVY.

An example of the high standard of an original school of sculpture that has been born on the Pacific coast of America is

"Victory" to Surmount Naval Monument at San Francisco—Showing Sculptor at Work.

illustrated in the monument to the American Navy now being erected in Union Square, San Francisco. This splendid conception is the work of Robert I. Aiken, a youthful San Francisco genius, who is just 24 years old.

The Monumental News says: "The ground for this monument was broken by President McKinley. The monument consists of a tall column, surmounted by a pure Corinthian cap, on the top of which stands a bronze statue of victory. The base is quadrangular in form and at each projection is the figure of a California bear."

The accompanying illustration shows Mr. Aiken at work on the statue.

A SETTLED SUBSCRIBER.

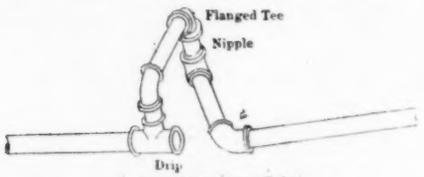
It takes the entire time of one clerk in the mailing department of Popular Mechanics to look after the changes in address of subscribers. Some of them change as often as every two weeks, and they do not like it if the paper fails to make the next town as soon as they do. We entered one subscriber this week who says we can depend on his address remaining the same for the next year, although it will give us pleasure to change it much sooner. The first line in the address consists of a number.

He is in the penitentiary.

SHOP NOTES

NOVEL BUT PRACTICAL EXPANSION JOINT.

An unusual type of expansion joint has been adopted in the power plant of the United Electric Co. of Newark. Thirteen boilers supply steam at 145 pounds per square inch to 9,000 horse-power of engines. The steam mains are small, 14 inches, and the engines are fed from a 12-



Novel Expansion Joint.

inch line. Near the throttle of each engine, says the American Electrician, is placed a receiver with capacity three times that of the high pressure cylinder. This insures an abundance of steam, and the drop from boiler to engine is only 3½ pounds. The expansion joints are unique, being made up of elbows and screwed nipples, as shown in the cut. The joint is very flexible, and contrary to what one might suppose, does not leak steam.

TINNING CAST IRON.

To be successful in coating with tin the castings must be absolutely clean and free from sand and oxide, says the Metal Worker. They are usually freed from imbedded sand in a rattler or tumbling box, which also tends to close the surface grain and give the articles a smooth metallic face. The articles are then placed in a hot pickle of 1 part of hydrocloric acid to 4 parts of water, in which they are allowed to remain from one to two hours, or until the recesses are free from scale and sand. Spots may be removed by a scraper or wire brush. The castings are then washed in hot water and kept in clean hot water until ready to dip. For a flux dip in a mixture composed of 4 parts of a saturated solution of sal ammoniac in water and 1 part of hydrochloric acid, hot. Then dry the castings and dip them in the tin pot. The tin should be hot enough to quickly bring the castings to its own temperature when perfectly fluid, but not hot enough to quickly oxidize the surface of the tin. A sprinkling of pulverized sal ammoniac may be made on the surface of the tin or a little tallow or palm oil may be used to clear the surface and make the tinned work come out clear. Some operators again dip in a pot of hot palm oil or tallow at a temperature above that of the melted tin, for the purpose of draining the excess of tin and imparting a smooth, bright surface to the castings. As soon as the tin on the castings has chilled or set they should be washed in hot sal soda water and dried in sawdust.

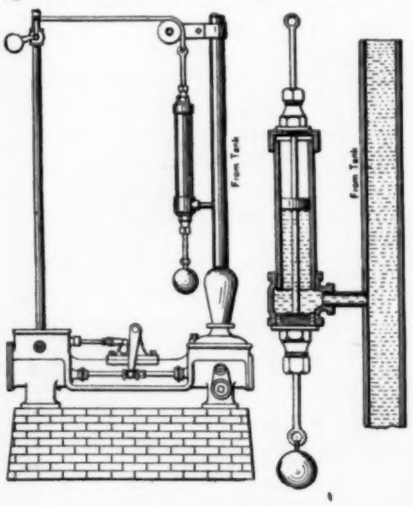
MECHANICAL VS. HAND FIRING.

At the recent Electric Light convention Mr. Abbott, of the Chicago Edison Co., said that the expense of a fireman lies more in the cost of the fuel that he wastes than in the wages which he receives. A fireman doing an ordinary day's work will burn, say, 8 tons of coal worth $2 per ton, amounting to $16; for this work he will be paid $2 a day. The boiler efficiency in an ordinary hand-fired plant does not average over 50 per cent, whereas on test conditions, the same fireman will sometimes get an efficiency as high as 75 per cent, and this economy, if it could be maintained, would amount to $5.33 a day. It is not to be expected that the very best results will be obtained day in and day out, but if the fireman were given less work to do, shorter hours, and a rest in the middle of his "shift," his work would be materially improved; and while it might be necessary to add one or two men to the pay-roll in some cases, the saving from the coal account would more than offset this additional expense.

HOME-MADE PUMP REGULATOR.

All sorts of devices are in use to regulate the pump for a tank supply. A writer in the Engineer, who had tried both the string and electric telltales with poor results, worked out a good one which he described as follows:

The discharge from the pump entered the bottom of the tank, so I placed a tee in the pipe and a short piece of pipe to bring the regulator near the steam pipe. On this was



Keeps the Tank Full.

placed a 1¼x2x1-inch tee. A piece of 2-inch pipe 1 inch long was placed in the 2-inch connection to form the body of the regulator, at the top of which was a reducing coupling with a ½-inch close nipple and a reducing coupling on each end to form a stuffing-box for the piston rod. In the lower end of the tee is a reducing bushing, and close and reducing couplings to form a stuffing-box, as in the other end. The inner coupling on this end is carried up as far as possible, so the piston can not close the inlet. The piston is made of lead with a rubber washer on the bottom to keep it tight. The upper rod is fastened to the valve that gives the pump steam, closing it when the tank is full, and opening it when water is taken out. The lower rod is used to place on the weight to balance the pressure in height that is wanted in the tank. When the tank is full the water pushes the piston in the regulator up, which causes the rod to close the steam valve and stop the pump. When the water is drawn from the tank the piston falls and the pump starts.

DOES A BOILER EXPAND UNIFORMLY?

Does that part of a steam boiler which is exposed to the fire expand less than the upper portion? A correspondent of The Engineer thinks it does, and suggests a simple experiment. If any of our readers burn their hands in the demonstration they must blame the Texas man, who says he tried it. The proposition is this: Almost any engineer or fireman will say that when you take fire away from that part of the boiler exposed to fire it will cool off and contract or shrink. I contend that after the fire is removed or put out, this part of the boiler will get hot and expand because any part of the boiler, including the flues, that is clean and is steaming is not at this time as warm as fresh milk, much less as hot as most people think it is. Now to give some idea of this matter take an ordinary cast iron teakettle with a smooth bottom, fill it half or two-thirds full of water and set it on the stove until the water boils, then take it off of the fire as quickly as possible with one hand and place the other hand on the bottom of the teakettle. It will be found that after a few seconds the bottom will get warm, then hot.

TO CEMENT PORCELAIN LETTERS TO GLASS.

The following directions for cementing porcelain letters to glass are given in the Show Window: Shake 15 parts of lime in 20 parts of water. Melt 50 parts of caoutchouc and 50 parts of boiled linseed oil together and bring the mixture to a boil. While boiling pour the liquid on the slacked lime little by little under constant stirring.

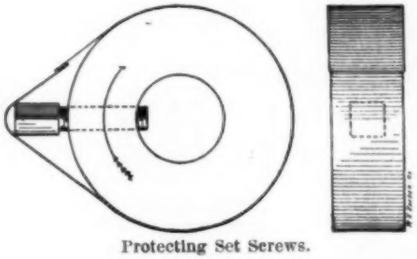
Pass the mixture while still hot through muslin, to remove any possible lumps, and let cool. It takes the cement two days to set completely, but when dry it makes a joint that will resist a great deal of pulling, whether from expansion or contraction.

COVERING DANGEROUS SET SCREWS.

A simple device for covering set screws which any one can make with a sheet of tin and a pair of tinner's shears, is described in the American Miller. You will notice the outside tap is a little wider than the inside, and runs backward, making it utterly impossible to catch on anything.

To make it, cut a strip of tin nearly, if not fully, the width of the face of the collar. Then turn the wide end one-quarter inch. (I use my saw clamp for the purpose.) Place the strip around the collar and over the top of set-screw. Mark it at the turned point, not at the bend. Cut off one-quarter inch longer, turn at the mark, hook with wide end outside, hammer down lightly on shaft. Place the band thus formed on face of collar opposite set-screw; lift onto head of screw, and there you are.

This can be used just as readily, and is as efficient in covering couplings where the



Protecting Set Screws.

heads and points of bolts are prominent. Let the tin be sufficiently wide to reach far enough on each side of coupling to effectually cover both heads and points of bolts. should the coupling be too wide to cover it conveniently with one piece, make two, one on each side, and let them come together on face of coupling.

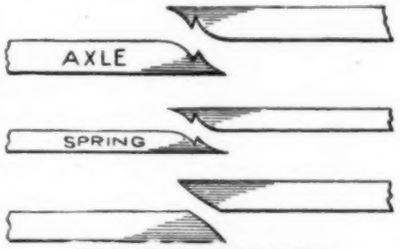
PIPE JOINTS.

A correspondent in the American Machinist writes:

We and others have had a good deal of trouble in making and keeping large threaded pipe tight, and we find that by threading the flanges ¾ inch to the foot taper and the pipe ⅝ inch to the foot that they stay all right. After settling the fact, it is easy to reason out why, as has been done in most other cases: After being threaded, the end of the pipe is thinner than farther back; this will compress, and when the thread is screwed home it is a fit all the way along. Thinning the thread of the pipe before it is screwed in is better than any paint or smear grease.

WELDING A BUGGY SPRING.

The old method of welding a spring by dovetailing has the obvious disadvantage of causing a double thickness at the very point which it is desired to heat first, says the American Blacksmith. The usual result is an injury to the spring by getting



Welding Broken Buggy Springs.

too hot at each end of the lap. A better way is to upset the ends well, scarf the same as with a steel tire, then take a chisel and cut a groove about ⅛ inch deep across the thick end of the scarf. Finish both ends the same and see that grooves fit each other nicely before welding.

Now heat the ends separately, the same as you would any piece of iron and put your spring well in fire so you do not burn off the thin ends. The grooves will make it impossible for the scarf to slip and you will have no trouble in making a good weld. Each scarf and groove can be made in one heat so there is no lost time and will save much trouble. The scarfs on a spring should be somewhat longer than on an axle. Steel axles may be welded in the same way.

LONDON PAYS RENT IN HORSESHOES.

A curious custom survives in London regarding the payment of rent of a piece of ground in the parish of St. Clements. Way back in the thirteenth century, in the year 1234 to be more precise, a blacksmith rented a lot from the crown to build a shop on, paying as rent six horseshoes and the proper number of nails. Later the property came into the hands of the city corporation at the same rental, so that ever since then the sheriff of London has annually paid to the city the six horseshoes and nails as rental.

DESIRE DOUBLE DOSE.

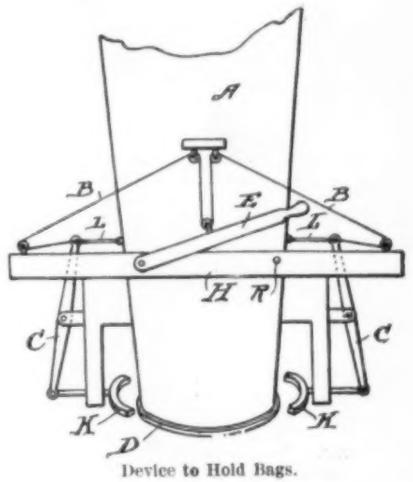
One of the representatives of this paper who recently sent in a large club from a Kansas town now writes: "Everyone that has taken Popular Mechanics tells me it is fine and wishes it came twice a week instead of once."

The fourth great seal for the United States has been made. So rapidly has the business of state grown that the last seal lasted but 17 years. The first seal, made in 1782, lasted nearly 60 years; the second 43. How long will the new one last?

HOME-MADE BAG HOLDER.

A home-made bag holder, in which the mouth of the bag is clamped instead of being torn by hanging on hooks, and which can instantly be released, is described in the American Miller.

A is the bin or spout. H is a board attached to bin, on which small pulley and lever E are fastened. C C are levers that work the clasps, K K, which tighten in on spout to hold the bag on when lever E is pulled. D is a half-inch iron ring on bottom of spout to support the clasps, K K, when tightened on bag. B B is a rope attached to lever E in center and to the top ends of levers C C. L L are elastic rubbers attached to bin and to the top of levers C C. In operation the bag is placed on end of spout with left hand. Pull lever E with right hand down over pin at R. The bag is now held securely on. To take bag



Device to Hold Bags.

off, pull lever off pin and let go. The elastic rubbers L L pull the clasps and lever back.

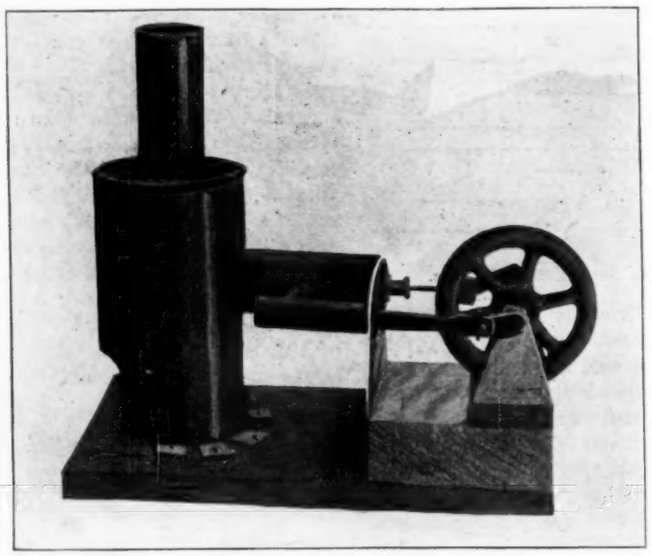
RESERVING CAR SEATS IN FRANCE.

The French are great on reserving seats in public conveyances. If you want to take a street car, you get in line, secure a number and are allowed to take the first car which comes along with a vacant seat. If there are two in your party and only one vacant seat only one can get on the car. In taking a trip in a day coach on the steam roads the Parisian secures a "pretict." It has a number and when he gets on the train even at the last minute he will find a coupon with his number printed upon it, in a vacant seat for him. By paying for more than one seat he can reserve for his own exclusive use as many seats as he desires. Reservations to be used the same day cost nothing; for one or more days in advance five cents for each seat reserved.

How to Make a Model Hot Air Engine

By A. A. Ward

A home made engine is something every amateur may reasonably be proud of; particularly is this sort of a hot air engine,



Hot Air Engine as Completed.

for it has no boiler to be attended to, but will run as long as the fire is kept up. At the same time it retains the beauty of design of a steam engine. The engine I propose to describe is shown complete in Fig. 1 and in the detailed drawings, Figs. 2, 3 and 4. It was all constructed without the use of a turning lathe, and is, therefore, within the reach of every amateur and need not cost more than twenty-five cents. Each part is marked with the same letter in the several cuts.

The large cylinder is obtained by cutting the top off a small hand bicycle pump with a file, making a piece 3 3-16 inches long. Mine was ¾ of an inch internal diameter. The cylinder B (Figs. 2 and 3) is a piece of ⅜ inch brass tubing 1 9-16th inches. Both have a 3-16-inch hole drilled in the side for the connecting pipe C. These three pieces are now to be brazed or hard soldered together and a disc soldered on the end of the small cylinder at D. Our cylinders are now complete. We next require a bed plate for them. For this a piece of 1-16 sheet brass is to be obtained and cut to the shape of Fig. 4. Mine cost 5 cents. Two holes, A and B, (Fig. 4) are cut out 1½ inches apart, center to center, to admit the ends of cylinders which are to be brazed in. The small one need not be brazed if inconvenient to do so. After drilling the screw holes m and holes for crank shaft n, (the size of a 6-penny wire nail) and soldering the cylinders the plate is to be folded up along the dotted lines as shown in Figs. 2 and 3.

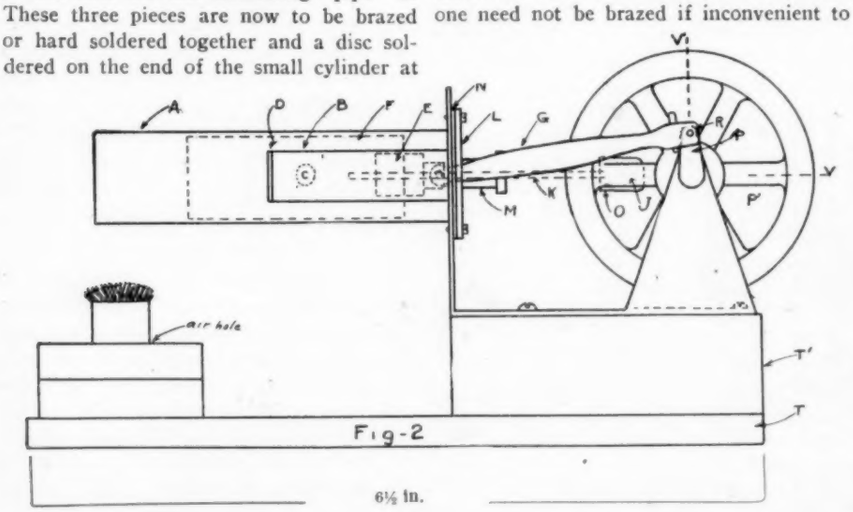


Fig-2

We will now make our pistons. For the small one a piece of ⅜-inch brass rod is obtained and a square shoulder filed on it as shown at E, (Figs. 2 and 3.) This has a slot filed in it to receive the connecting rod, G, and drilled for the pin I, (Fig. 3.) The large piston or plunger is simply a piece of hardwood and should have from 1-32 to 1-16 air space all around, while the small one must be air tight but work easy. The large plunger is shown at F, (Fig. 3, also Fig. 2.) I cut mine off a broom handle.

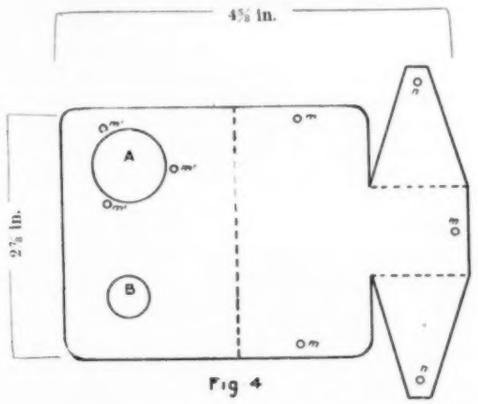


Fig 4

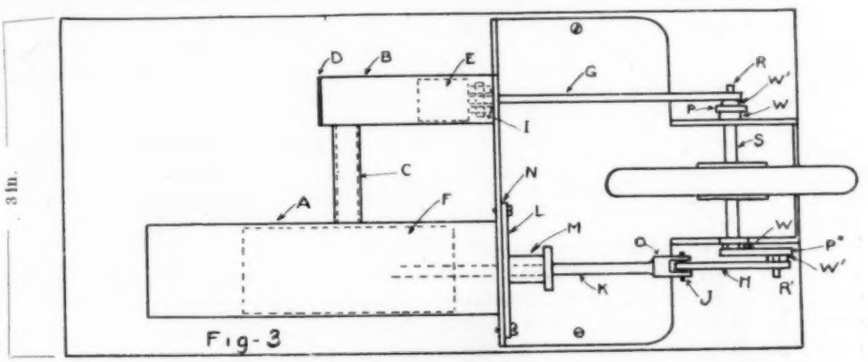


Fig-3

The piston rod, K, is a piece of good stiff wire, 1-16 inch in diameter, driven into the wooden piston, a small hole being drilled first as a help. The large cylinder requires a head and piston rod guide, which is made to resemble a stuffing box. It is simply a piece of brass rod, M, fastened to a disc of brass, L, and having a hole drilled to admit the piston rod. The ornamental flange is a piece of square brass wire wrapped around the end of stuffing box and soft soldered. Three small holes are to be drilled in the cylinder head for screws and also in the bed plate as shown at m', (Fig. 4.) These are to be tapped. Needless to say the piston must be centered before drilling these. This can be done by wrapping paper around it before inserting in the cylinder,

and placing the cylinder head. A rubber gaskit, N, is to be placed between cylinder and head to make it air tight. The cross head, O, Fig. 3, dotted lines in Fig. 2, is next to be filed up and drilled for piston rod, K, and connecting pin, J, also slotted to receive connecting rod, H, shown only in Fig. 2. The connecting rods, G & H, are cut from 1-16 sheet brass to the size and shape shown. Are a little less than 2-3 full size in drawings. Holes in large one, G, 2¼ inches apart from center to center, and in H, ⅞ inch apart.

We are now ready for our crank shaft and fly wheel. The latter is off a valve, while the shaft is a six penny wire nail cut to proper length. The cranks, P, P′, are cut from 1-16 brass and drilled for crank pins, R, R′, and shaft S crank pins are best fastened by riveting first, filing a shoulder on one end. The cranks are to be soft soldered on to shaft, first putting wire ring washers on as shown at W, also on crank pins W′, Fig. 3. The cranks are to be set at an angle of 95 degrees to each other; that is, just a little more than at right angles. See dotted lines, V, V′, Fig. 2. To fasten the fly wheel to shaft, lay it on a board having a hole drilled to admit half the length of shaft, insert the shaft and pour melted lead into the square hole and it is done.

Our engine is now complete and ready to be screwed down to the base board T, and block T′. The alcohol lamp is made out of a salve box and a piece of ½-inch brass tubing. The cover and tube must be soft soldered. Cotton string makes good wicking. A pin hole is punched on top of lamp as an air hole.

We are now ready to start it. Light the lamp and in a minute or two turn the fly wheel. The working is as follows: Referring to Fig. 2 it will be seen the small or power piston E is half on the outward stroke and the large one full out. In this position the air is in the hot end of the large cylinder where it expands and drives the piston, E, out. As it reaches the end of the stroke the plunger or displacer, F, moves back, forcing the air to the other end of the large cylinder where it contracts, thus allowing the piston, E, to slide in by the pressure of the atmosphere and momentum of the fly wheel.

The large piston will be best made of a piece of brass tubing, having a disc brazed on each end with a hole in the center to receive the piston rod, to be also hard soldered in.

The furnace shown in Fig. 1 while in no wise necessary adds much to the appearance and keeps drafts from the lamp. It is made from a ¼ lb. baking powder box and a piece of ¾-inch brass tubing for a chimney. The tube is slit ⅜-inch all around and every other flap turned up. It is then inserted in the hole on top of the box, and the remaining flaps turned over on the inside.

ANCIENT ENGLISH FIRE ENGINE.

An old town fire engine which did service in Stowmarket, Eng., in the early part of the 18th century, has recently been resurrected. Printed instruction for its proper working appear on the front of the pump. To keep the pump in order it is suggested that "the pevets of the long iron spendil be drest with sallet oyl and tallow," while the hose after use is to be "liquored with neatsfoot oyl, bees wax, and tallow and quoiled up."

The Engineering Times of London says: "The engine, which is in an excellent state of preservation, is composed of a wooden well, 6 ft. long by 15 in. wide, lined with copper, with openings at each end for the purpose of receiving the water, which was fed by hand. The pump is at one end, and is worked by ordinary hand-bars. The engine is mounted on four small solid wooden wheels, the leathern buckets with which it was originally fitted have all disappeared, but the delivery-pipe, which is some 6 ft. long, can still be attached."

Stowmarket's Ancient Fire Engine.

PRODUCTION OF NATURAL GAS.

At an average price of 15 cents per 1,000 cubic feet, the value of the natural gas used in this country last year amounted to $27,067,500. If 20,000 cubic feet of gas be taken as an equivalent to one ton of coal at $3.20, the gas used equals 8,458,600 tons of coal. At the close of the year there were 10,297 producing wells. More gas was produced than in the preceeding year, but pressures were less and pumps were needed in many places. Fully 1,000,000 homes and 5,742 industries are using natural gas as fuel.

SIMPLE METHOD OF COOLING MILK.

For centuries before the storing of winter ice for summer use, or cold storage plants were dreamed of, the natives of India and Mexico cooled their drinking water by wrapping their water jars with wet cloths and setting them in a breeze. Hoard's Dairyman tells how a Texas farmer used the same idea.

"The dairy building was a latticed frame covered with mustang grape vines and fairly exposed to winds, and thoroughly protected from the rays of the sun. The top of an old circular dining table was placed in the center of this structure upon three stakes driven into the ground. Three wooden pegs, fourteen inches high, formed a triangle in the center of the table. On these three pegs a tin hub, holding about eight gallons, was placed, and nearly filled with water. The milk vessels were cans twelve inches high and holding about two and one-half gallons each. For each can a bag was made of coarse cotton cloth, which loosely fitted the cans and was about a yard long. The milk or cream was placed in these cans, and the cans inserted in the bags, and placed in a circle on the table, and the loose ends of the bags twisted and tossed over the edge of the tub and into the water. The bags, before putting the cans of milk into them, were dipped into the water and wrung. These bags would take up the water from the tub, and remain wet through the hottest day in August, and the evaporation would keep the milk perfectly sweet for more than twenty-four hours in the hottest weather, and the butter made was firm enough to print, and could be kept in that condition by the same treatment. This apparatus is exceedingly simple, and the materials to make it are at hand on every farm. It is strictly scientific refrigeration."

RECIPE FOR HYPO SOLUTION.

The following combined bath, without gold, and employed in the ordinary way, will give a wide range of browns, verging closely on the purple, says the American Amateur Photographer. The prints will be much more prominent than is generally supposed. It is the acid introduced into the hypo bath which produces the beautiful results:

Table hypo	3 ounces
Acetate of lead	60 grains
Alum	½ ounce
Water	16 ounces

Dissolve the hypo in the water, then the lead and lastly the alum; let it stand for 24 hours, then filter. It may be used over and over again with increasing advantage.

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HOW DOES IT SEEM TO YOU?

It seems to me like I'd like to go
Where bells don't ring, nor whistles blow,
Nor clocks don't strike, nor gongs don't sound,
And I'd have stillness all around.

Not really stillness, but just the trees'
Low whisperings, or the hum of bees,
Or brooks' faint babbling over stones
In strangely, softly tangled tones.

Or maybe a cricket or katydid,
Or the songs of birds in the hedges hid,
Or just some such sweet sounds as these
To fill a tired heart with ease.

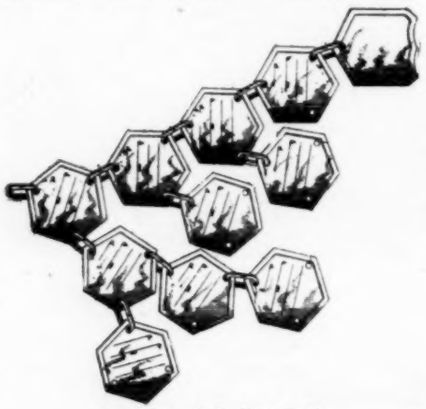
If 'tweren't for sight and sound and smell,
I'd like a city pretty well.
But when it comes to getting rest
I like the country lots the best.

Sometimes it seems to me I must
Just quit the city's din and dust
And get out where the sky is blue,
And say, now, how does it seem to you?

—Eugene Field.

GRAFTING ON TO THE FAMILY TREE.

During the last few years people generally have become greatly interested in their ancestors, and getting up a genealogy is all the rage. A New Yorker has conceived the idea of using a series of discs made of strong cardboard and each punched with three holes. You write John



Sure Enough Endless Chain

Smith with proper dates on one card, and proceed to fasten to it as many more cards as there are little Smiths, and so on down the line.

THE OFFICE MAN'S FRIEND.

The Meyercord-Batterman Co. of Chicago, Ill., the well-known stationery specialties manufacturers, have recently brought out and put on the market a new flexible desk pad. The material employed in its manufacture is a patented composition which makes the pad absolutely flexible, to enable it to be rolled up without breaking or cracking, and will therefore not warp, which is a serious objection to the blotter holder pad now on the market. It entirely obviates the necessity of using blotters and is a great economy and convenience. The pad is almost indestructible and with reasonable wear and tear will practically last a lifetime. The surface of this pad is treated in the same manner as finishing wood, and is made to match any finish of desk desired. The back of this pad is covered with canton flannel so as not to mar or scratch the finest desk. It has on its surface an interest computing table, postal rates table, an 18-inch measure and the metric system reduced to inches, in imitation of inlaid wood and pearl, which are very convenient adjuncts. The company has already secured some very large contracts from the leading institutions of the country, and the pad is rapidly supplanting the old-style blotter heretofore used all over the country.

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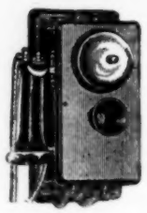

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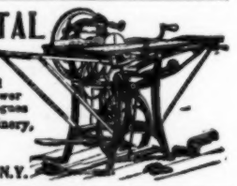

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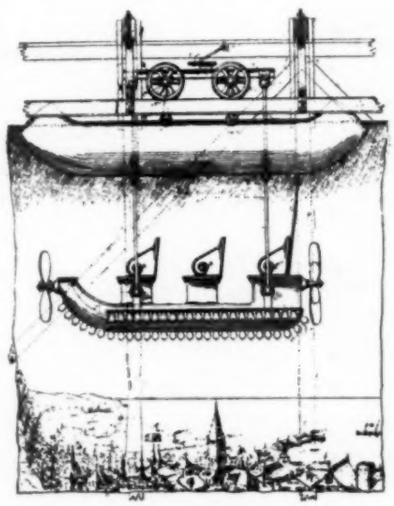


Aerial Merry-Go-Round

the "ground" are placed very minute trees, buildings, churches, etc. Your chariot has an air propeller fore and aft, which is run by an electric motor, for effect only. As a matter of fact you are only a few feet in the air, but the perfect proportion of the objects on land and sea is what creates the illusion.

HOW URALITE IS MADE.

Uralite, the new fireproof material which seems absolutely fireproof, announced in Popular Mechanics of October 4, is the invention of a Russian artillery officer and chemist named Imschenetzky. U. S. Consul Hughes writes from Coburg of tests he witnessed in which uralite successfully withstood 2,350 degrees F. of heat. A small box made of uralite, containing papers, a book and a lump of paraffin wax also passed through the same fire. The papers and book were unharmed and the wax but slightly melted.

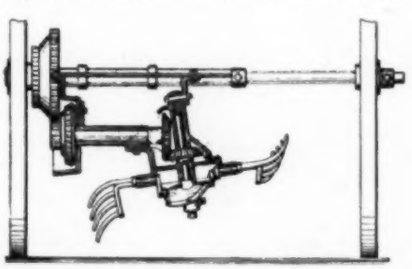
The chief ingredients are asbestos, freed from sand, mixed with an equal amount of whiting. These are placed in a beater, such as used in paper making, water being added until the mass will run onto a machine such as is used in making strawboard. Passing through this machine it is partially dried, and from the machine is wound on a drum until 115 layers are secured. While winding on the drum a solution of sodium silicate containing sodium carborate is sprayed onto the sheet, making the layers stick together.

The sheet consisting of the 15 layers is then taken from the drum and cut into pieces 3 ft. wide by 6 ft. long. A sheet of fine wire gauze is laid upon each sheet, which is then placed in a press. The pressure is gradually increased until at the end of 30 minutes 200 pounds pressure is reached. After 90 minutes more it is removed, allowed to harden 24 hours, then fired in a kiln.

The sheets are then steeped in a solution of sodium silicate, washed, left to dry, and again passed through a kiln, after which they are steeped in a solution of sodium carbonate, and washed and dried as before. These subsequent operations are repeated as often as required for the final hardening of the sheets, and the entire process occupies several days. The sheets are stacked for some days and once more fired. After seasoning they are ready to use. Uralite may be worked with carpenter's tools like wood, painted and finished. The sheets are 3-32 of an inch thick. Extreme cold or heat has no effect upon it. The contents of a room lined with one layer of these sheets may be totally consumed, but the fire will not spread elsewhere.

MECHANICAL POTATO DIGGER.

Here is the latest patent in a potato digger. The forks shown are made to get busy at a furious rate, and with the old



white horse drawing the machine will dig potatoes faster than his son Reuben when the old man is watching.

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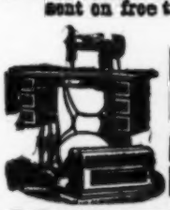

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